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# PUBLIC HEALTH REPORTS

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## THE RELATION OF THE RAILROADS IN THE SOUTH TO THE PROBLEM OF MALARIA AND ITS CONTROL.<sup>1</sup>

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Because of the influence of railroads as agencies of civilization and development, their interests have come to have many features in common with those of the communities which they serve. This is particularly so with reference to economic and sanitary affairs, especially in those sections of the United States in which malaria is quite prevalent. The railroad aspects of this disease are therefore of fundamental importance.

*Malaria and its relation to railroads.*—The feature of greatest consequence in the relation between railroad interests and the general problem of malaria is the heavy economic burden resulting from diminished earnings, directly through the unnecessary illness, impaired efficiency, and losses of time among employees of the railroad, and indirectly through a similar handicap upon the industries and communities from which railroad revenues are primarily derived. Greatly increased costs of operation of agricultural and industrial enterprises with resulting diminution in output of crops and products; serious interference with the use of materials, power, and other natural advantages, and finally the physical depression of the population all go with a high rate of prevalence of malaria and affect the economic stability of railroads.

*Responsibilities of railroads toward the problem of malaria.*—Public works and more especially railroad construction operations have long been notorious for their incidental contributions to malaria hazards by creating conditions favoring the development of Anopheles mosquitoes. Among these conditions may be mentioned: Badly located and undrained borrow pits, at times uninterruptedly traversing thickly settled communities; improperly cut right-of-way ditches that have not been provided with outlets; improperly placed culverts and crossings, installed possibly with a view to saving a few feet of pipe or yards of masonry, but preventing the off-flow of normal and storm waters and at times interfering with an entire system of

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<sup>1</sup> Read at the meeting of the Surgeons of the Central of Georgia Railroad, Montgomery, Ala., May 15-16, 1918.

natural surface drainage; inadequate provision for drainage behind or through embankments and fills across valleys, resulting in the impounding of water or interference with the normal off-flow of a natural watershed; installation of leaky water towers or failure of provision to carry off their overflow.

These conditions are by no means restricted to this country alone and have long been striven against elsewhere as well as here. Marchiafava and Bignami have discussed the importance of railroad construction in increasing the malaria of a region, and Giles<sup>1</sup> states:

The results of public works are equally disastrous on a larger scale. Every road and railway has, on either side of it, a continuous chain of "borrow-pits," which, in rainy weather, form simply ideal nurseries for mosquitoes of all sorts.

An additional measure of responsibility comes to the railroads because of the dissemination of infection through their labor gangs, which, often badly infected, are moved from place to place and housed in cars permitting the unrestricted access of mosquitoes. This link in the epidemiologic chain of malaria is of first importance, and there can be no doubt that malaria of severe form has been thus introduced not infrequently into fresh environments.

*The railroad problem and its solution.*—In view of the apparent magnitude of the problem and its diversified character, it might at first appear too monumental to be given consideration at this time. Much, however, can be accomplished by gradually improving existing conditions and no effort should be spared to prevent their recurrence in connection with new works. As may be inferred, much of the systematic solution of the railroad problem of malaria is of a purely engineering nature and will lie largely with departments other than the medical, but there is also an equal if not larger element which constitutes the domain of the physician and sanitarian. An individual having some knowledge of sanitary engineering and preventive medicine would be best qualified to act as executive for this part of the work, since he would be able to unify the several departments affected.

*How malaria problem of railroads can be met.*—It appears well to summarize in some detail the steps which railroads can take in dealing with the malaria problem. Work given under A and B should in general be undertaken by the engineering departments; that under C and D by the medical and sanitary departments.

A. *Old construction conditions.*—Correction or alleviation of anopheles-breeding and malaria-producing conditions created in connection with previous construction by:

Drainage or filling of borrow pits and low areas where practicable.

Proper provisions for drainage (in a sanitary sense) behind embankments and fills across valleys.

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<sup>1</sup> Handbook of the Gnats or Mosquitoes, 2d Ed. London, 1913, p. 197.

Replacing to true gradient of culverts, where necessary.

Drainage or other provision for care of overflow waters at tanks and towers.

Clearing of weeds and refuse at regular intervals (supplemented by oiling if needed) from right-of-way ditches, especially in and adjacent to settlements.

B. *New construction conditions.*—Consideration of sanitary features in connection with new construction works; that is, prevention or correction of conditions menacing the health, especially of settlements and communities. To this end, consultation should be had with the sanitary or medical department before construction is begun. Preference should be invariably given to sanitary works which will influence as large a number of individuals as possible.

C. Encouragement of and participation in intensive mosquito-control campaigns conducted in the communities through which railroads pass.

Careful and thorough treatment of actual cases of malaria among employees at hospital and by local surgeons so as to prevent development of chronicity and relapse as far as possible. The importance of this is paramount, as the presence of malaria among employees is one of the principal causes of inefficient and indifferent service.

Statistical observations through morbidity reports. Reports should be made at stated intervals by each local surgeon to some central office to determine the classes of employees in which most cases appear to originate. These data are indispensable for accurate guidance in the establishment of prophylactic measures.

Education. Systematic educational activities should be engaged in by means of literature, lectures, and, if possible, by actual demonstrations. An exhibit car accompanied by a lecturer is an excellent and popular method of disseminating information. It should be thoroughly impressed upon people that malaria is insidious, communicable, preventable, and curable only by proper and protracted treatment. Where car screens, mosquito bars, or quinine for immunization are employed, their use should be carefully explained.

Consultation with the engineering and maintenance of way departments. The desirability of attention to sanitary features in connection with construction operations has already been referred to.

D. *Prevention of malaria among the several classes of employees.*—Employees may be grouped with reference to the character of their occupations as follows:

1. Engineers, firemen, conductors, and brakemen.
2. Shop mechanics, car repair men, builders, etc.
3. Bridge and construction outfits.
4. Section crews.
5. Extra and steel gangs.

Much of the control work already indicated will affect employees directly, especially those who have a more or less permanent place of abode (for instance, mechanics who live near their shops). But many of those whose duties require their transfer from one section of the line to another can hardly benefit by intensive control work instituted at given points. This latter group constitutes by far the greater proportion of the total employees of a railroad system and is also the group in which the influence of malaria has been greatest. Their protection, then, is a matter which should be given consideration at the outset.

While difficult, their problem can be met by the use of carefully installed and maintained screens for the windows, doors, and other apertures of their bunk cars, supplemented, if thought desirable, by the use of quinine for immunization. Active cases of malaria occurring in construction, extra and steel outfits constitute a menace of the gravest character to their associates and to the near-by communities. Such cases, when applying for care, should be thoroughly treated before being returned to their units.

It has been suggested that the foremen of different outfits performing more or less similar classes of work could be given an interest in the welfare of their gangs in a competitive way by the offer of a fairly substantial bonus to the foreman who is able to present the best and cleanest efficiency and health record at the end of some stated period.

Where it is possible to afford protection to a large number of employes, such as shop mechanics, or repair men and car builders, the line of attack most productive of excellent results is that of intensive control of mosquito production. This class of employees is usually compactly settled in communities which, as has been repeatedly demonstrated in the United States as well as elsewhere, may be rendered practically malaria free at low relative costs.

Education may be employed as a powerful agency for the prevention of malaria among employees. Once the elemental facts of the nature, cause, and transmission of malaria are understood by a sufficiently large proportion of the working force, an immediate return in diminished sickness, increased efficiency, and greater satisfaction among the workers may be confidently expected.

*Results obtained in malaria control in connection with railroads.*—Quite early in the history of malaria Celli demonstrated the efficacy of screening the cottages of railroad employees along the Rome-Solomona Division, a notoriously malarious section of Italy. In 25 protected cottages, 173 inhabitants had 8 cases of fever, whereas in 30 unprotected cottages 220 inhabitants had 203 cases.

Of more immediate application, however, is the work now in progress as a part of the routine of the St. Louis & Southwestern

Railroad. Impressed with the fact that about 25 per cent of all admissions to the hospital at Texarkana were for malaria, an average of 640 cases being so treated for five days each annually during the past four years, and that this was equivalent to about 4 per cent of the total number of employees, even without including cases seen by local physicians, Mr. Edwin Gould created a fund for the institution of systematic preventive measures. These were begun early in 1917 at the request of the railroad by representatives of the United States Public Health Service, and were later continued by H. W. Van Hovenberg, who was appointed by the railroad to supervise this work. The data here given were obtained from Mr. Hovenberg's reports. In general, the program included intensive control by suppression of the propagation of *Anopheles* mosquitoes at Tyler and Lufkin and later at Texarkana, Keltys, and Wildhurst.

In 1916 32 malaria cases were admitted to hospital at Texarkana from Tyler and Texarkana, whereas in 1917, following the malaria work, only 13 cases were admitted, a reduction of 59.4 per cent. The sale of physicians' prescriptions containing quinine was decreased about 49 per cent. Among bridge and building gangs, whose bunk cars were screened, a reduction of 47.7 per cent was obtained in the number of cases of malaria in 1917 over 1916.

Of particular interest are the results obtained at Keltys, a small lumber community, where malaria had been severe. After one year of work practically no malaria occurred. The mill is stated to have shipped 20 per cent more lumber than ever before. The manager said that had the disease prevailed as in the past the mill would have been closed about half the time, with a freight loss to the Cotton Belt Railroad Co. of about \$30,000 during the months of July to October. The officials of this road have expressed themselves as highly gratified with the results obtained and will continue and extend the antimalaria measures.

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## VENEREAL DISEASE CONTROL.

### AN ORDINANCE PROVIDING FOR THE QUARANTINE OF CASES OF VENEREAL DISEASE UPHELD BY A KENTUCKY COURT.

A telegram, dated August 1, 1918, from Louisville, Ky., states that the legality of a venereal disease ordinance, based on the suggested regulations approved by the Surgeons General of the Army, the Navy, and the Public Health Service, has been upheld by a local court of common pleas, with five judges sitting. The proceeding was habeas corpus seeking the release of a woman held in quarantine for the treatment of venereal disease. The regulations referred to were published in the Public Health Reports March 29, 1918, page 435.